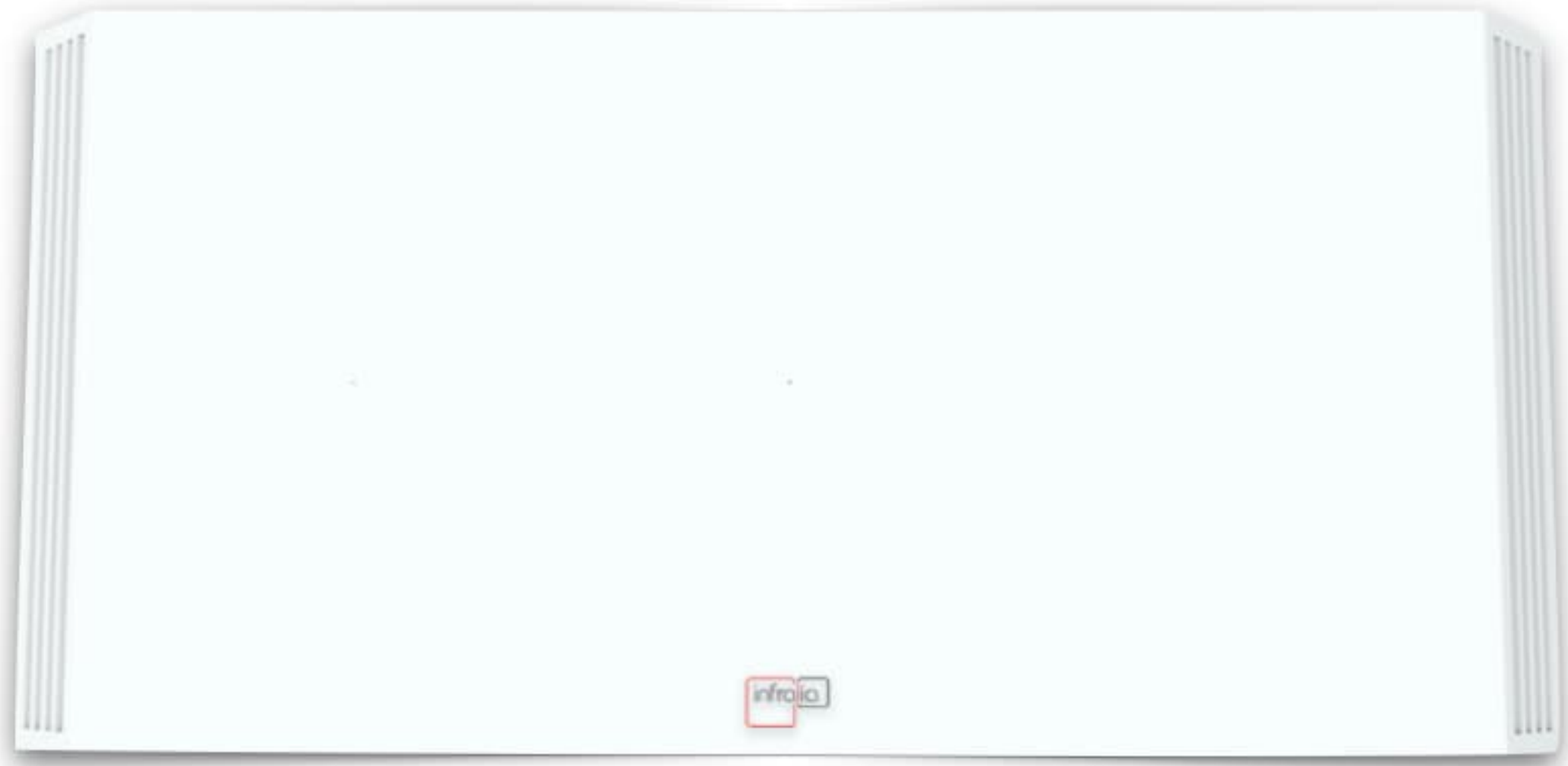




SUNINU

AIRFLOW UVC STERILIZER





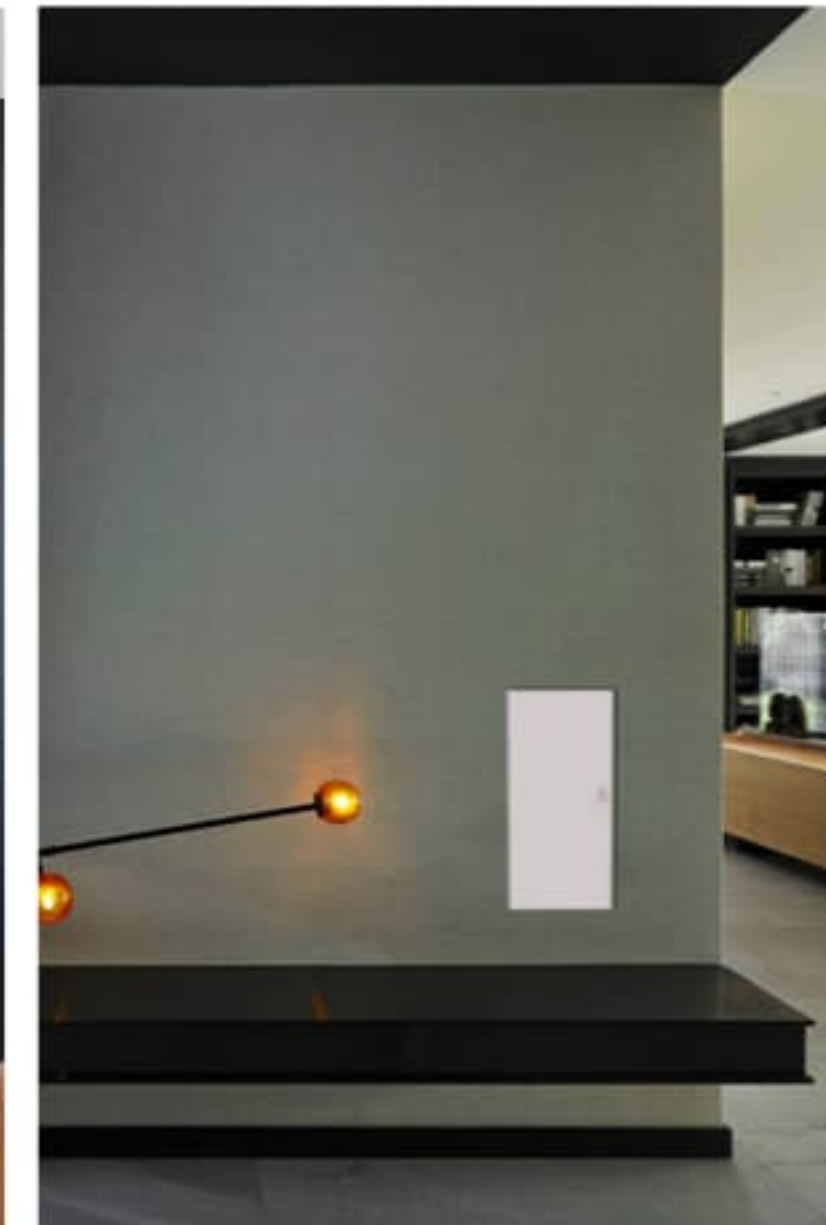
COMBINATION OF FUNCTION AND VALUE

MULTIPLE DESIGNS

FLEXIBLE AND VERSATILE INSTALLATION
CEILING EMBEDDED AND WALL MOUNTED

MINIMALIST DESIGN

BLENDING INTO A VARIETY OF DECOR STYLES



General

Airflow UVC sterilizer

is a UVC & Micron-E technology sterilizer for disinfection of bio aerosols under different operating and airflow conditions in any room.

It is powered by a high volume ventilator to perform a quick air circulation in the room, inhaling polluted air with airborne microorganisms(virus/bacteria/pathogen, etc)

Inside the sterilizer, there are different independent germicidal chambers, which are solely operating to form multiple medical-grade intensive kill zones:

- 1.To kill airborne virus, bacteria and pathogens instantly and constantly;*
- 2.To filter and neutralize hazardous substances, such as dust particles, aerosols, etc...*

Airflow UVC sterilizer,

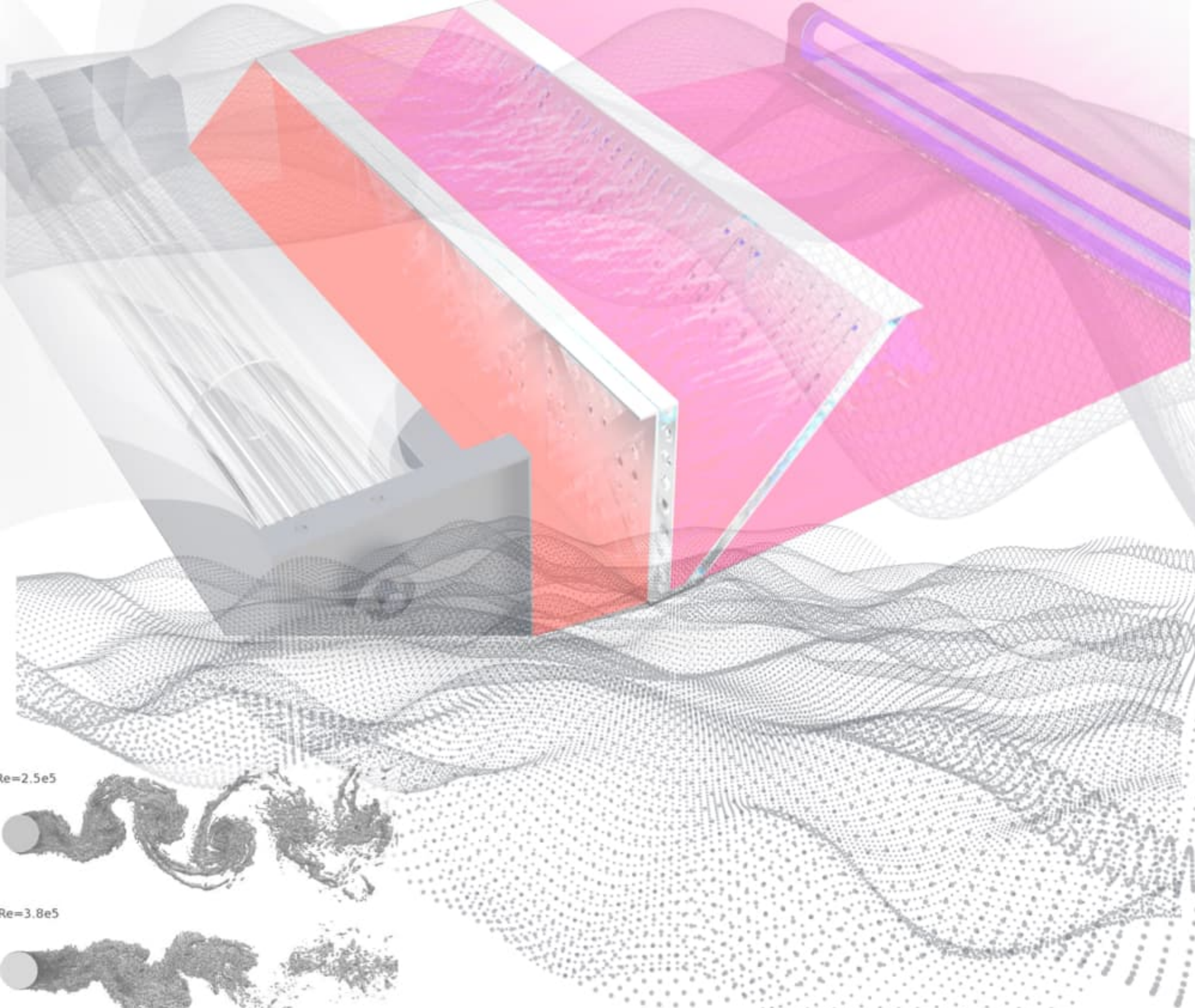
is giving up any filter screen design, reducing the cost of use and maintaining a high flow rate for efficient air disinfection.

Airflow UVC sterilizer

is the first multi-kill disinfectant that integrates multiple cutting-edge technologies to ensure efficient air disinfection.

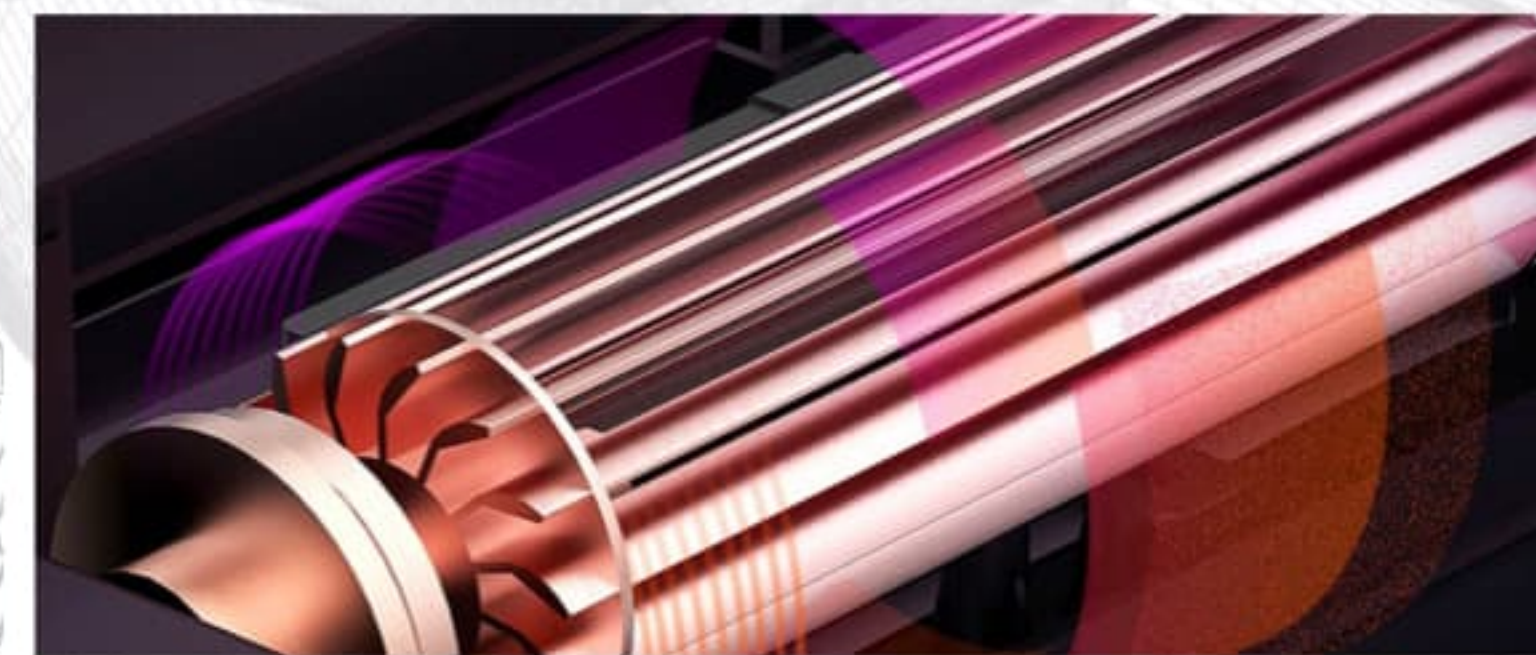
It can be integrated with SuninS system to realize an automation disinfection, and can be operated by App to realize a regular & scheduled disinfection.





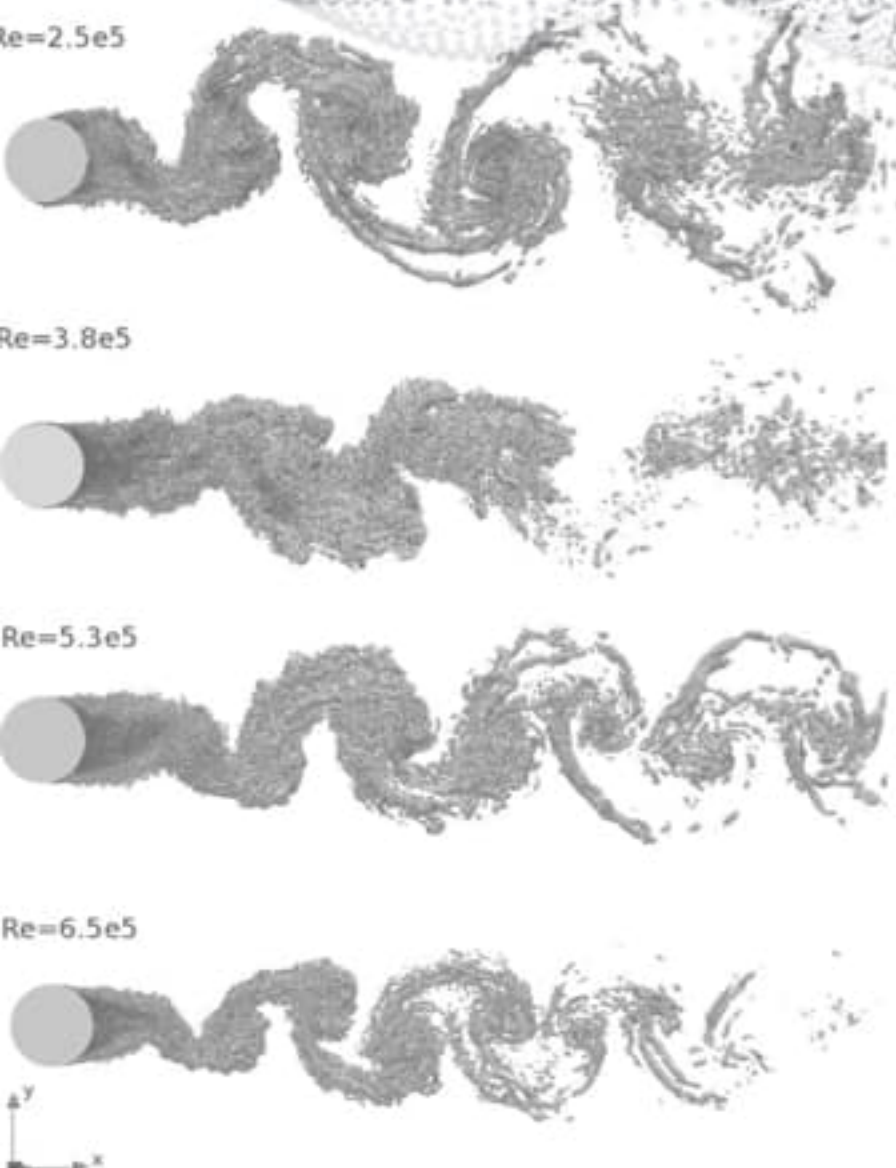
Why does Aerodynamic rotation matter?

UVC is a broad-spectrum, effective and proven sterilization solution. However, few realizes that any pass-through irradiation air sterilizer's performance is highly related with the airflow velocity and its form, because of UVC physical irradiation principle for sterilization.



The key about sterilizer design:

In our Airflow UVC sterilizer, Aerodynamic rotation is perfectly programed as to the best fluid mechanics: It is Compressing, Twirling, Slowing & Speeding the airstreams in different rotations according to each kill-zone chamber setting, allowing the airborne hazardous substance to be fully exposed when through. This is the key to obtain a best sterilization performance.



What would effect UVC germicidal performance?

*UVC is a physical sterilization technology. We need to make sure two keys for germicidal results:
 1, The duration of UVC radiation is sufficiently long
 2, The intensity of UVC radiation is enough*

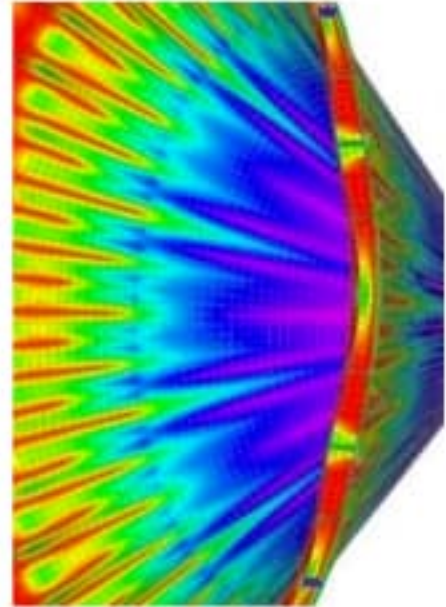


Chambers introduction

Compression chamber | Rectification chamber | Hybrid chamber

Compression chamber

The multiple blades ventilator inhales the fresh air in the sterilizer to form a continuous flow, converting the air stream with airborne particles from an astatic Brownian movement state into a recto-linear path, preparing to enter the first rectification chamber.



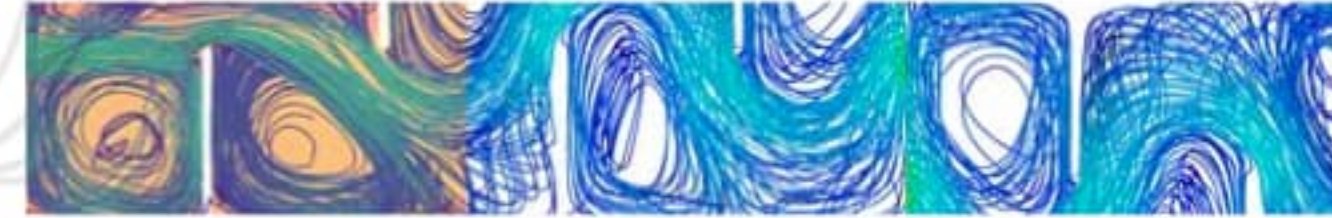
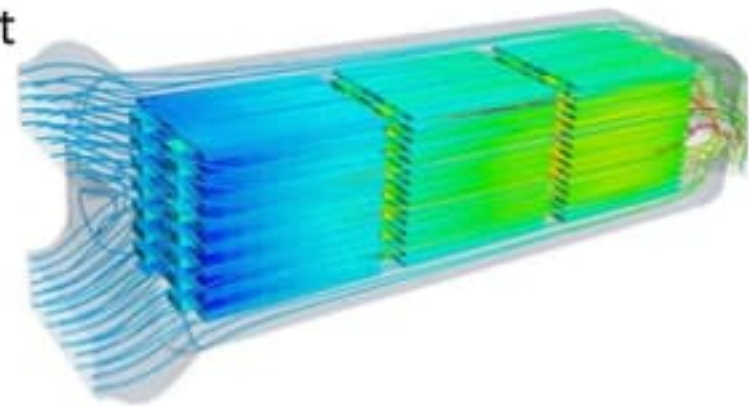
Rectification Chamber

Two different rectification chambers are set among three kill-zone chambers.

Each rectification chamber is programmed by fine hydromechanics to rectify the air stream into different forms, entering accordingly to the next kill-zone chamber setting.

The air streams are twirled into directional rotations. The airborne hazardous substance particles will be actuated into a constant well-regulated rolling, exposing all its surfaces to the UVC irradiation and lightning matrix during its presence in the kill-zone chamber.

Repeated and intensive irradiation has been ensured, for a strong sterilization performance.



Hybrid chamber

In this chamber there is another sterilization technology which is applying: The Micron-E filter free purification.

With the Micron-E system, airstreams entering will be merged together, forged into larger ones with lower velocity, but still with a high volume, preparing for Micron-E matrix processing.



Along with the airstreams, all nano to large grained solid-state particles will be forced negative charged once entering.

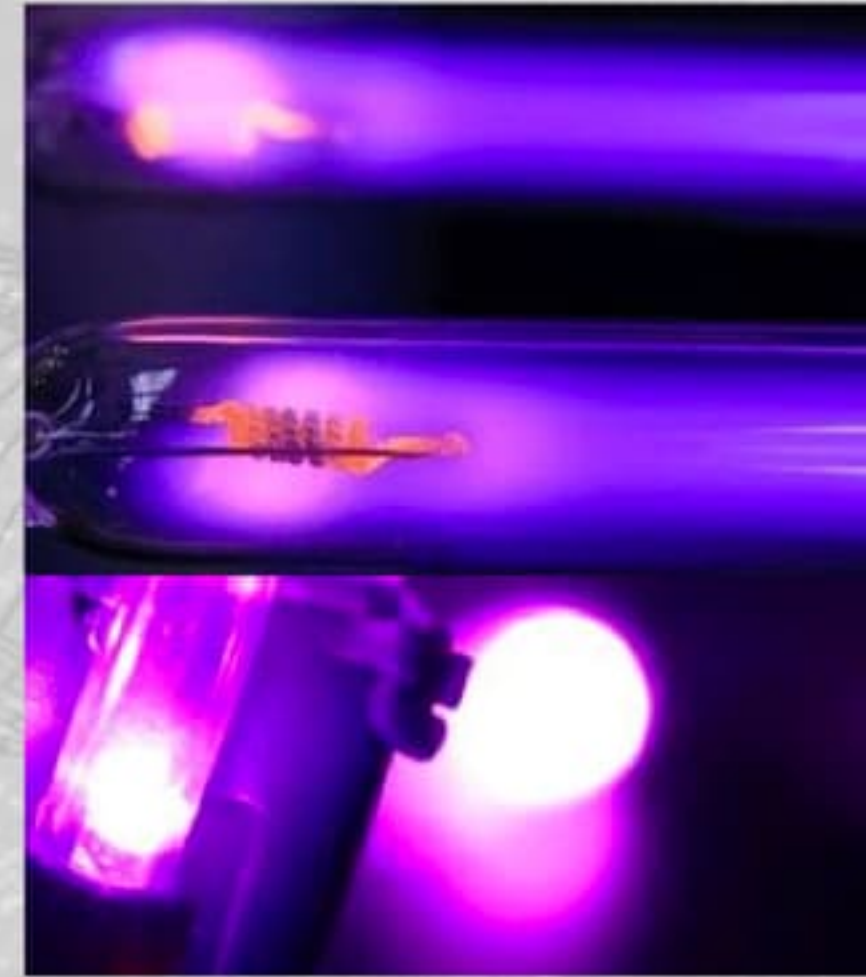
Inside this chamber, a high-voltage electric potential difference is created, under a strong drag-force created by this electric field. All these solid-state particles will be forced to settle down to the base, which is parallel linked to the earth.

This is our filtering solution without any filter screen part. It is an economic and clean solution to prevent hazardous substance accumulation and further circulation back into the space.



How UVC works?

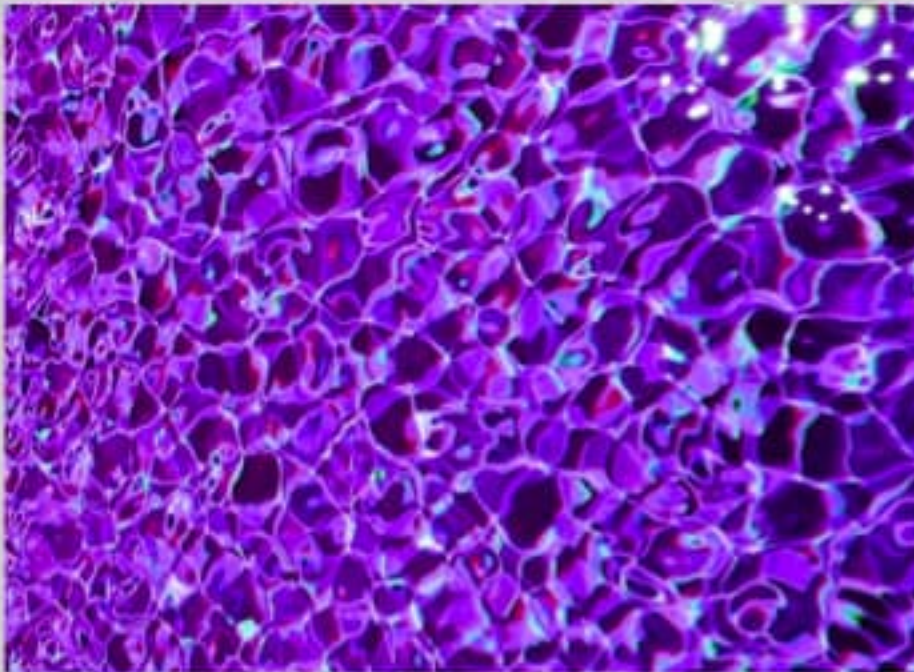
The powerful germicidal effect is provided by the UVC which is shortwave sterilizing Ultraviolet light. With the high photon energy when irradiating micro organisms, it can penetrate into the cell membranes and nuclei, breaking down the molecular bonds of their DNA and RNA, causing them to lose their ability to replicate or becoming inactive and die.



In our Airflow UVC sterilizer, we have two solo sterilization chambers equipped with high intensive UVC 254,7nm/184,7nm germicidal output.

Initiated by the supplier patented thermo-pole emitter, encapsulated by SLS glass.

Thanks to a well air flue dissipation design, its lifespan is expanded to 10.000 working hours, twice as much as the designed lifespan.



UVC enhancement: A high intensive infinite reflection

All inner surfaces of the chambers are treated with extreme ultra-high density coarse diffuse reflection nano-layers, which are barely with UV optical loss



This is an innovative and effective way to exponentially increase the UVC radiation intensity.



The medical grade UVC light is diffusely reflecting inside a closed space and forms a superposition of intensive 3D cross-lined and seamlessly irradiation matrix with the same frequency.

This is an important technology supported by the aerodynamic rotation technology, and these both settings give the airborne micro organisms (virus/ bacteria/pathogens) no way to escape from the UVC kill-zones.





What is the Micron-E matrix technology?



The Micron-E high voltage electric matrix is the second sterilization solution, independent from the UVC.

A perfectly controlled circuit is designed to create millions micro lightnings per second, to form a 20mm width thunder matrix, filed inside the hybrid chamber of the Airflow UVC sterilizer.



If any airborne micro organisms is passing through, these micro lightnings would crack its shell to electrocute the core to kill or neutralize instantly.

What about the competitor products?

Filter:

competitor products are usually with a filter in front of the inhaler.

A filter is supposed to stop particles from the air, but meanwhile it will also accumulate airborne micro organisms (virus/bacteria/pathogens) to settle down on it.

This will result in turning this filter into a perfect breeding bed for these micro organisms, and enabling them to grow exponentially, when the filter is considered as shadow corner in case the sterilizer is off.

Every time afterwards the sterilizer is working, unavoidably a filter brings in more of these hazardous substance back into the room.

UVC efficiency:

As mentioned earlier, there are two key effects for UVC germicidal performance:

1, sufficient UVC irradiation duration

2, sufficient UVC irradiation intensity

For those who simply apply a UVC light inside, and circulating the air in and out, we found out that they have no understanding or consideration on airflow velocity.

The duration of stay is too short to let UVC irradiate sufficient energy on airborne micro organisms, so we seriously doubt about the performance of these products in practical conditions.

In lab conditions, they will have good test results, because lab test conditions are usually considered as the most ideal simulation conditions.

Capability of Air Filters to Retain Airborne Bacteria and Molds in Heating, Ventilating and Air-Conditioning (HVAC) Systems

M Möritz¹, H Peters, B Nipko, H Rüdén

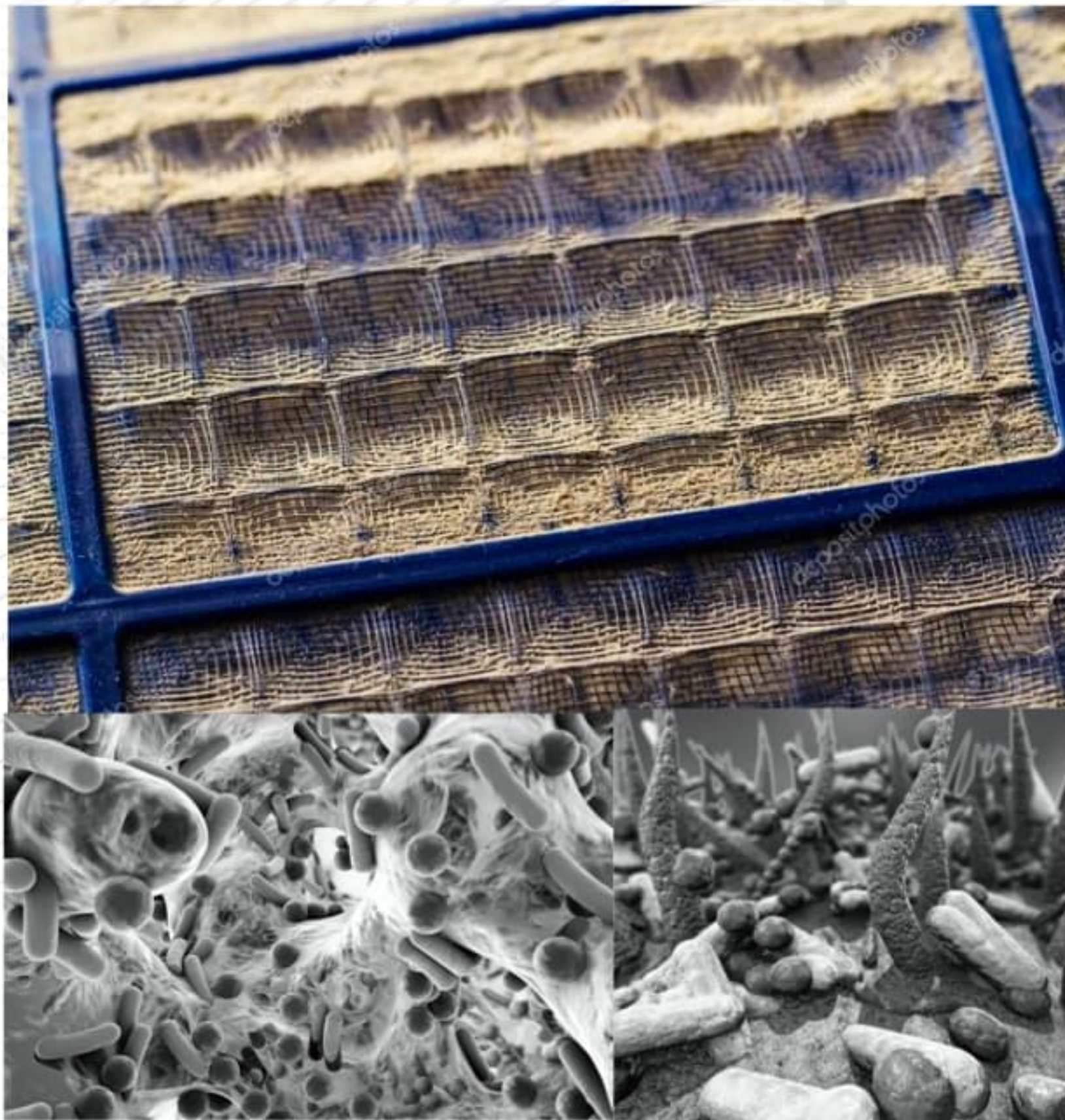
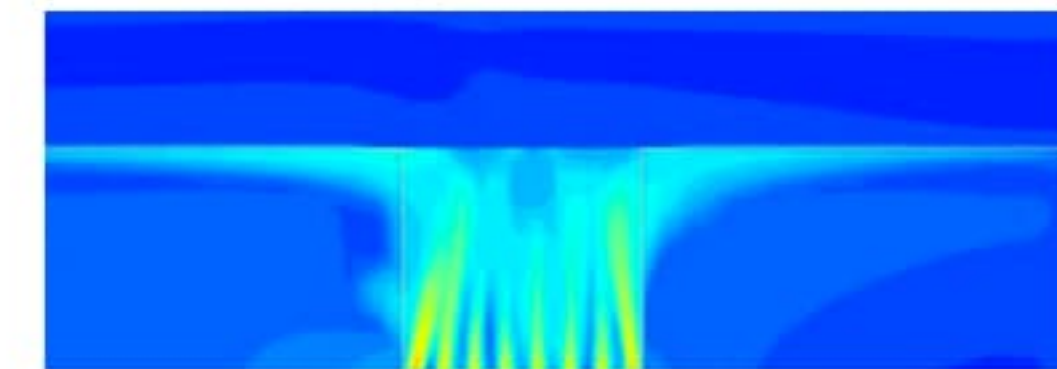
Affiliations + expand

PMID: 11556144 DOI: 10.1078/1438-4639-00054

Abstract

The capability of air filters (filterclass: F6, F7) to retain airborne outdoor microorganisms was examined in field experiments in two heating, ventilating and air conditioning (HVAC) systems. At the beginning of the 15-month investigation period, the first filter stages of both HVAC systems were equipped with new unused air filters. The number of airborne bacteria and molds before and behind the filters were determined simultaneously in 14 days-intervals using 6-stage Andersen cascade impactors. Under relatively dry (< 80% R. H.) and warm (> 12 degrees C) outdoor air conditions air filters led to a marked reduction of airborne microorganism concentrations (bacteria by approximately 70% and molds by > 80%). However, during long periods of high relative humidity (> 80% R. H.) a proliferation of bacteria on air filters with subsequent release into the filtered air occurred. These microorganisms were mainly smaller than 1.1 microns therefore being part of the respirable fraction. The results showed furthermore that one possibility to avoid microbial proliferation is to limit the relative humidity in the area of the air filters to 80% R. H. (mean of 3 days), e.g. by using preheaters in front of air filters in HVAC-systems.

More over, filter will accumulate large particles such as dust to block the inhaler, lowing down the air velocity, low down the disinfection result. That is why filter needs to periodic replacement.



Open access peer-reviewed chapter

Impact of Air-Conditioning Filters on Microbial Growth and Indoor Air Pollution

By Amira Hassan Al-abdalall, Sarah Abdullah Al-dakheel and Hmidah Abdulhadi Al-Abkari

Submitted: April 10th 2019 Reviewed: July 11th 2019 Published: September 6th 2019
DOI: 10.5772/intechopen.88548



Lots of studies on bacterias growth on a filter of HVAC system

Reduced humidity linked to increased COVID-19 risk

by University of Sydney



Credit: CC0 Public Domain

A study conducted in Sydney during the early epidemic stage of COVID-19 has found an association between lower humidity and an increase in locally acquired positive cases. Researchers discovered a 1 percent decrease in humidity could increase the number of COVID-19 cases by 6 percent.

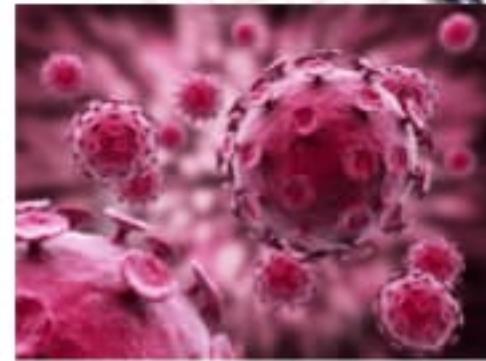
As to **Newest Study** from Sydney University on spreading of COVID-19, humidity is a key but ignored factor that will effect the spreading of COVID-19.

The scientist shows prove that a 1% percent decrease in humidity could increase the number of COVID-19 cases by 6%.



When the humidity is lower, the air is drier and it makes the aerosols smaller. Those smaller infectious aerosols can stay suspended in the air for longer.

That increases the exposure for other people. When the air is humid and the aerosols are larger and heavier, they fall and hit surfaces quicker.



Earlier study showed that:

In moisture condition, COVID-19 pathogen can live more than 5~9days on the the surface; but its activity is significantly getting very low if temperature raised up to 30°C, when they're expected to be killed in minutes under a 56°C circumstance.

New study shows that:

COVID-19 have longer or shorter lifespan on different material's surface. Here is the table on the right. scientific research proves that either for bacterias, or for virus, temperature is always a challenge to their survival.

Condition	Temperature	Survival time
Air	10-15C	240mins
	25C	2-30mins
droplet	<25C	24hrs
snot	35C	30mins
Liquid	75C	15mins
Hand	20~30C	<5mins
Fabric	10-15C	<8hrs
Wood	10-15C	48hrs
Stainless steel	10-15C	24hrs
75%alcohol	Any	<5mins
Bleaching water	any	<5mins
Soap water	any	<5mins



FIR is new and effective heating solution, one of its benefits is the form of FIR heat won't change climate humidity, its FIR energy is directly projecting to all surfaces in front, raising up object's surface temperature.

For COVID-19, aerosol is considered as major infection among the crowd. Either the aerosol is larger or smaller, once it is settle down on these surfaces, FIR heat is an easy and effective way to disinfect and kill.

Airflow UVC sterilizer is targeting at disinfecting the atmosphere, it is a active disinfection, with ventilator to inhale polluted air and exhaust treated air, airborne microorganisms (virus/bacteria/ pathogen...) have been disinfected by a combination of two new technologies.

Especially for aerosols floated in air, Airflow UVC sterilizer take action to disinfect and kill.

FIR + UVC:

Dual-mode hybrid disinfection:

Rapid disinfection, high penetration rate, sterilization efficiency must be the best result on market.

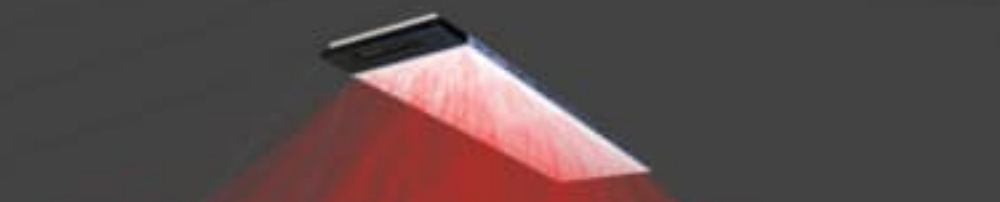


SUNINS + SUNINU

FULL BENEFICIAL SPECTRUM OF SUNLIGHT TO
CREATE A HEALTHIER INDOOR CLIMATE



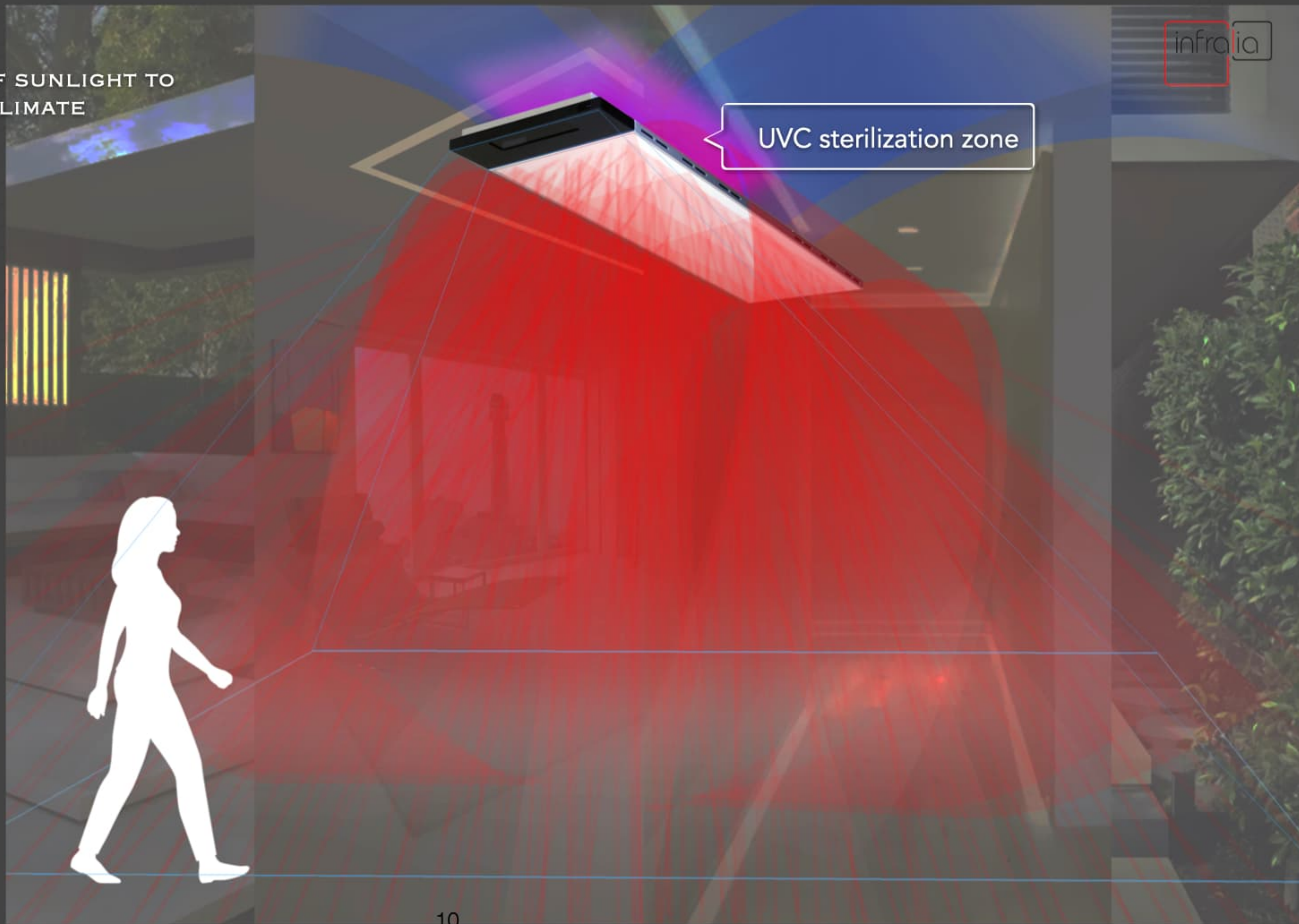
Auto-pilot



Passive FIR+UVC



Force heating+sterilizing



UVC sterilization zone

SUNINS + SUNINU

**FULL BENEFICIAL SPECTRUM OF SUNLIGHT TO
CREATE A HEALTHIER INDOOR CLIMATE**



AIRFLOW CONTACT STERILIZATION

A large area 320°C FIR motivating surface
Any airborne bacteria/pathogen once contacts the surface, would be burnt in milli-second because of ultra-high temperature.
Temp-leap tech to shorten initial working time to only 3mins to reach a peak working temperature.
The ventilator's air volume exchanging capacity is 100cfm=170m³/h, circulating hot and cold air in the room, forced bringing the air to contact the FIR motivating surface to enhance the sterilization result.

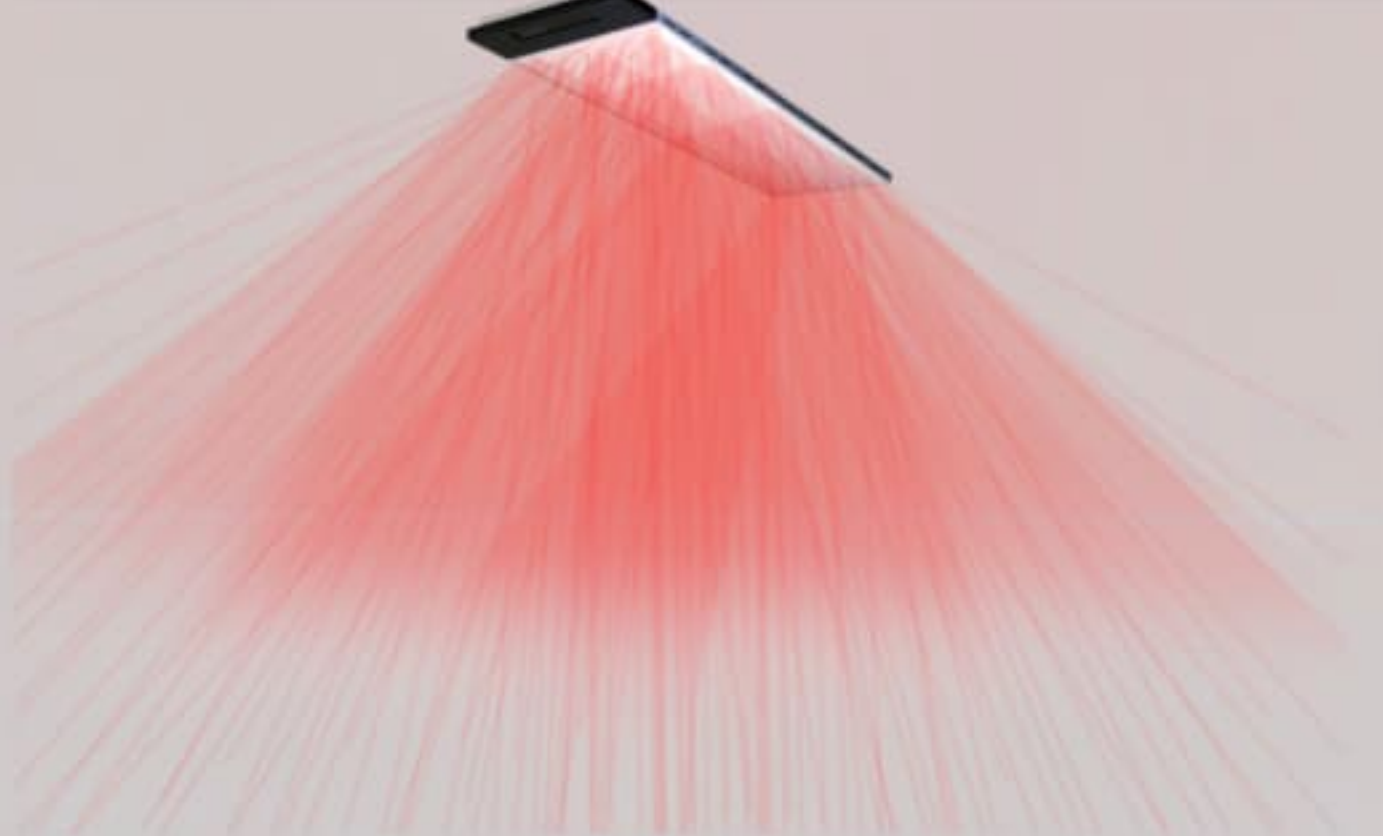


AIRFLOW HIGH-TEMP STERILIZATION



A large air-cooled heat exchanging chamber, constantly 240°C at working.
A 240°C high-temp chamber is working like an oven, with three separated curved air flues.
SuninS ventilator is compressing cool air into the chamber, to mix with the heat to generate the hybrid heat;
Airflow will be slowed down, traveling through the complicated inner frame structure, if any airborne bacteria/pathogen in the airflow, a high-temp condition will help to dehydrate, low down its activity or even kill them.

ENVIRONMENT HEAT-DRY STERILIZATION



High density FIR radiation, 8m distance maximum
SuninS is projecting direct FIR heat energy on all surfaces in its front. FIR has very good thermal efficiency.
All object temperature will raise, moisture will be quickly evaporated.
This is breaking down breeding bed for bacteria/pathogen, which prefers a warm and wet condition.

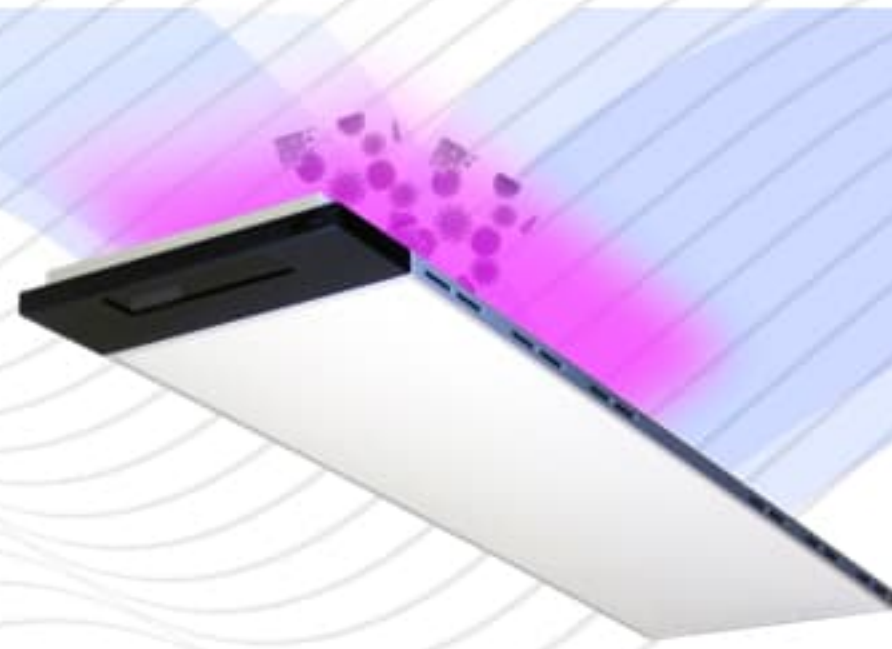
AIRFLOW & ENVIRONMENT UVC STERILIZATION



The extensional UVC sterilization module.
UVC module projects upwards with high-density UVC to form into a "Kill zone" damaging bacteria/pathogen DNA.
Because of negative pressure generated by the ventilator, airflow moves in a spiral or winding course.
It makes any airborne bacteria/pathogen staying longer within the "kill zone".
UVC density is ~180 times more than UVC sterilization requires, would help to shorten sterilization period down 0.16 second, bacteria/pathogen DNA would be damage to die.



FIR+UVC package #1:
UVC attached module for SuninS



FIR+UVC package #2:
SuninS & ceiling embedded Airflow UVC sterilizer



FIR+UVC package #3:
SuninS & wall mounted Airflow UVC sterilizer



FIR+UVC PACKAGE SOLUTION WITH UVC MODULE & AIRFLOW UVC STERILIZER

Specification	UVC attached module for SuninS	Airflow UVC sterilizer	
		Airflow UVC sterilizer for SuninS	Solo Airflow UVC sterilizer
Rated Input		220V/50HZ	
Power	8W	36W (+Micron-E)	
Size	50*160*25mm	300*600*70mm	280*580*65mm
Weight	0.5kg	4kg	
Air treatment efficiency	100CFM	125CFM	50CFM
Disinfection technologies	UVC & Ultra-high temperature	High-density UVC & Micron-E & Ultra-high temperature	High-density UVC & Micron-E & Ultra-high temperature
Suggested applying area	N/A	45sqm	
Db noise	45db	49db	32db
Installation	Directly attached to SuninS	Ceiling embedded installation	Ceiling/wall surface mounted
Power supply	SuninS extensional power dock		Wall socket
Controlling	SuninS Sync control		WIFI & Radio control
Operating	Supporting SuninS automation mode; solo working by SuninS remote controller		Supporting Android & IOS; remote controller, timer inbuilt

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